



BURNSIDE

**Township of Centre Wellington
Noise Impact Assessment**

**Proposed Operations Centre
Centre Wellington Operations Centre,
Fergus, ON**

**R.J. Burnside & Associates Limited
292 Speedvale Avenue West Unit 20
Guelph, ON N1H 1C4**

**February 2023
300055234.0000**



Noise Impact Assessment
February 2023

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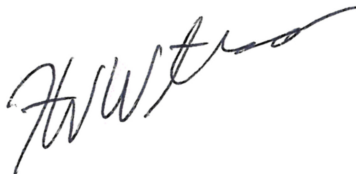
R.J. Burnside & Associates Limited

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Executive Summary

R.J. Burnside & Associates Limited (Burnside) was retained by Centre Wellington to prepare a Noise Impact Assessment for the Centre Wellington Operations Centre public works centre. The property is located at 965 Gartshore Street, Fergus, Ontario.

The proposed facility is a public works centre. The site will house snowplows, municipal works vehicles, materials such as salt and sand for winter road maintenance, a front-end loader, a fuel depot, and all facilities needed to maintain the equipment. The site will also contain an administration building which will have HVAC units and an emergency generator.

As the proposed equipment which will generate noise emissions are not yet available for measurement Burnside relied upon sound level measurements of similar equipment which was taken at other facilities Burnside has attended in the past, as well as manufacturer sound level data for other similar equipment.

The sound levels from these sources were modeled to determine the impacts at the nearest noise sensitive receptors. The resulting sound levels were compared to the applicable Ministry of the Environment, Conservation and Parks (MECP limits of a Class 2 Area in order to determine whether mitigation measures were necessary. Ambient noise calculations were not performed; therefore, reliance was made on the exclusion limits.

The assessment revealed that the stationary sound levels from the proposed sources within the development, at most points of reception on the proposed development are above the MECP limits; therefore, stationary noise mitigation measures are required.

The required measures include:

- An acoustic barrier and berm combination of a minimum height of 5.1 m along the south west property line. For the northern half of this property line the height may be lowered to 4.7 m.

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1.0 Introduction

R.J. Burnside & Associates Limited (Burnside) was retained by Centre Wellington to prepare a Noise Impact Assessment for the new Centre Wellington Operations Centre public works centre. The property is located at 965 Gartshore Street, Fergus, Ontario.

The purpose of this assessment is to examine potential noise impacts relating to the proposed Centre Wellington Operations Centre on the above noted property.

1.1 Objective

This report has been prepared in support of the new Centre Wellington Operations Centre public works centre. This report will be included in a submission for Official Plan Amendment (OPA) and Zoning By-Law Amendment (ZBA). The potential noise impacts were determined using Predictor V2022.12 3D noise modeling software. Sound levels were predicted based on the equipment planned for Centre Wellington Operations Centre.

The potential noise impacts were evaluated by comparing the predicted by comparing predicted sound levels at the representative points of reception with the Class 2 Ministry of the Environment, Conservation and Parks (MECP) exclusion limits.

1.2 Study Area

The proposed Centre Wellington Operations Centre is located on Gartshore Street in Fergus, Ontario. The site location map is provided in Figure 1.

The proposed development is in an area currently zoned by Fergus as A - Agriculture. The zoning map is provided in Figure 2.

The Site Plan is shown in Figure 3.

1.3 Proposed Facility Use

The proposed facility is a public works centre. The site will house snowplows, municipal works vehicles, materials such as salt and sand for winter road maintenance, a front-end loader, a fuel depot, and all facilities needed to maintain the equipment. The site will also contain an administration building which will have HVAC units and an emergency generator.

2.0 Applicable Noise Criteria

2.1 MECP Noise Policies

Environmental Noise Guideline – Stationary and Transportation Sources – Approval and Planning (NPC-300) is the MECP Publication which provides advice, sound level limits and guidance that maybe used when land use planning decisions are made under the Planning Act, and the Niagara Escarpment Planning and Development Act. This guidance is for land use planning authorities, developers and consultants. It is intended to minimize the potential conflict between proposed noise sensitive land uses and sources of noise emissions.

2.1.1 Stationary Noise

The applicable stationary noise criteria are dependent on the Class Area as well as the ambient sound levels present at each point of reception. The applicable criteria are the greater of the exclusion limits, provided in the MECP tables in Appendix A, or the lowest hourly ambient sound level predicted for a given point of reception.

The proposed Centre Wellington Operations Centre public works centre is located in a Class 2 Semi-Urban Area.

The MECP criteria for the outdoor receptors considered in this report are 50 dBA from 07:00 – 23:00.

The MECP criteria for the plane of window receptors considered in this report are 50 dBA from 07:00 – 23:00 and 45 dBA from 23:00 – 07:00.

MECP tables showing all criteria for all Classes of Urban Areas and all time periods are shown in Appendix A.

2.2 Regional and Municipal Policies

In addition to the preceding MECP noise criteria from NPC-300, the proposed development is also subject to any municipal policies or regulations issued by the Town or the County. The Township of Centre Wellington and the County of Wellington do not have a noise development policy at this time.

3.0 Stationary Noise Sources and Receptors

3.1 Noise Measurement Procedure

As the proposed noise sources do not yet exist reliance was made on conservative sound emission data from previous Burnside measurements of similar equipment, or manufacturer published data of other similar equipment. No direct sound level measurements were undertaken.

3.2 Internal Stationary Noise

Internal stationary noise is defined as the on-site stationary noise of the proposed development. The potential impact of internal stationary noise is assessed at neighbouring noise sensitive land uses and at noise sensitive locations within the proposed development itself, if appropriate.

3.2.1 Internal Stationary Noise Points of Reception

The proposed Centre Wellington Operations Centre public works centre is in proximity to the following noise sensitive land uses:

- POR01: 99 Harper Crescent
 - Located southwest of the proposed site.
- OPOR01: 99 Harper Crescent
 - 30 m from POR01 dwelling in the direction of the sources.
- POR02: Future approved residence no address
 - Located south of the proposed site in an approved but not constructed subdivision.
- OPOR02: Future approved residence no address
 - 30 m from POR02 dwelling in the direction of the sources.
- POR03: Future approved residence no address
 - Located south of the proposed site in an approved but not constructed subdivision.
- OPOR03: Future approved residence no address
 - 30 m from POR03 dwelling in the direction of the sources.
- POR04: Future approved residence no address
 - Located south of the proposed site in an approved but not constructed subdivision.
- OPOR04: Future approved residence no address
 - 30 m from POR04 dwelling in the direction of the sources.
- POR05: 950 Gartshore Street
 - Located north of the proposed site.
- OPOR05: 950 Gartshore Street
 - 30 m from POR05 dwelling in the direction of the sources.

These points of reception are shown in Figure 4.

3.2.2 Internal Stationary Noise Sources

The proposed development contains the following sources of stationary noise:

- **EX001: Emergency Generator**
 - The unit is assumed to operate for 20 minutes during the day when testing operations would take place. Emergency operations of the generator are exempt.
 - As the mechanical details are unavailable at this time Burnside has assumed a sound power of 112 dBA.
- **EX002 – EX003: HVAC units**
 - Burnside has assumed 1 ton of air conditioning is required per 400 square feet of building. The proposed building has an air-conditioned area of approximately 18,500 ft². Burnside has therefore assumed two 25-ton units, which have an assumed sound power of 95 dBA. A noise reference is provided in Appendix D.
- **EX005: Front End Loader**
 - One front end loader will operate continuously in the worst-case hour, during daytime only. Burnside has assumed a sound power of 107 dBA based on a manufacture reported sound data of an equivalent machine. A reference is provided in Appendix D.
- **EX006: Truck Movements**
 - 10 trucks of various types are assumed to travel through the property in a worst-case hour. This rate applies for all times of day. These sources include snowplows, material delivery trucks, and other municipal equipment. Burnside has assumed a sound power of 101 dBA based on a commonly used and MECP accepted estimate.
- **EX007: Fuel Trucks**
 - One fuel truck is assumed to travel a shorter route through the site for fuel delivery during the daytime only. Burnside has assumed a sound power of 101 dBA based on a commonly used and MECP accepted estimate.
- **EX008-EX009: Mechanical Shop Noise**
 - Two mechanics shops for working on the vehicles stored at the site will emit noise through their open garage doors. It's assumed that the sources will operate for 20 minutes of each worst-case hour. Burnside has assumed a sound power of 102 dBA based on a measurement of a similar source at another facility. A reference is provided in Appendix D.
- **EX010: Car Wash Noise**
 - The car wash bay of the maintenance department will emit noise through the open garage door. It is assumed the washes will be conducted with pressure washers and the washers will be operational for 30 minutes of the worst case hour. Burnside has assumed a sound power of 99 dBA, which is based on Burnside's measurement of a similar source elsewhere in Ontario. A reference is provided in Appendix D.

The location of each noise source is shown in Figure 5.

4.0 Stationary Noise Impact Assessment

4.1 Methodology

Sound levels associated with stationary noise are predicted with Predictor V2022.12 3D noise modeling software. Predictor follows the ISO 9613/2 method of sound level calculation as implemented in the ISO 17534-3 Quality Assurance standard.

The following settings are used:

- Calculation height: 4.5 m.
- Default Ground attenuation Factor: 0.5 (0 is reflective).
- No Barrier effect for direct sight – Active.
- Dmax According to ISO 9613 – Active.
- Avoid overestimating barrier effect – Active.
- Terrain model: Use full DTM.
- Temperature: 283.15 K.
- Pressure: 101.33 kPa.
- Air humidity: 70%.¹

4.2 Applicable Criteria

As the proposed development is not located near any major roads so no ambient sound levels were calculated. Instead, the MECP exclusion limits for a Class 2 area were be used. The applicable sound level criteria for stationary noise are presented in Table 1.

4.3 Predicted Internal Stationary Sound Levels

The predicted internal stationary sound levels of the proposed development onto the neighboring noise sensitive land uses and noise sensitive locations within the development itself are presented in Table 2. Figure 6 presents the predicted unmitigated daytime sound level contours. Figure 7 and Figure 8 present the evening and nighttime levels respectively. All contours are calculated at a height of 4.5 m. Sample Printouts of the internal stationary noise modeling are provided in Appendix B. The results demonstrate that sound levels are predicted as high as 56 dBA, which is 6 dB above criteria.

Therefore, as the unmitigated internal stationary sound levels are not compliant with the applicable sound level criteria for all PORs, mitigation is required.

4.4 Predicted Mitigated Internal Stationary Sound Levels

An acoustic barrier along the south-west property line is proposed to mitigate the noise exceedances. The acoustic barrier is 2.6 m tall along the most southern 190 m of the

¹ ISO 9613 Requirement

property line. The northern 245 m of the south-west property line requires a shorter barrier of 2.2 m tall. Both barriers are proposed to sit atop a 2.5 m earth berm, constructed at a 3:1 slope within the 15 m allowance. A secondary test model demonstrated that if a policy of closing the mechanic shop doors was enforced at the facility the barrier requirement would drop to 2.2 m tall for the full distance. The 2.5 m berm would still be required as well.

Acoustical barriers must be constructed in a structurally sound manner, designed to withstand wind and snow loading. The barrier must have a minimum surface density of 20 kg/m². The barrier must be constructed without cracks or surface gaps. Any gaps that are under the barriers that are necessary for drainage purposes should be localized and minimized, so that the acoustical performance of the barrier is maintained.

With these mitigation measures included, the internal stationary sound levels were reassessed. The results of this mitigated assessment are shown in Table 3, which indicates that compliance is now met. Figure 9 presents the predicted mitigated daytime sound level contours. Figure 10 and Figure 11 present the evening and nighttime levels respectively. All contours are calculated at a height of 4.5 m. Sample Printouts of the internal stationary noise modeling are provided in Appendix C.

Therefore, with the inclusion of the mitigation measures described above, the internal stationary sound levels will be compliant with the applicable sound level criteria for all PORs.

The proposed alignment for the acoustic berm/barriers is shown in Figure 12.

4.5 Predicted Emergency Generator Stationary Sound Levels

The emergency generator is assessed separately as required in NPC-300. NPC-300 also allows an additional 5 dBA above the exclusion limits. Daytime testing of the generator is the only aspect required to be assessed. Any emergency operation outside of daytime hours is considered exempt. The mitigation measures presented in Section 4.4 are included in the analysis of the emergency generator.

The predicted internal stationary sound levels of the proposed development onto the neighboring noise sensitive land uses and noise sensitive locations within the development itself are presented in Table 4. Figure 13 presents the predicted unmitigated daytime sound level contours. The contours are calculated at a height of 4.5 m. Sample printouts of the internal stationary noise modeling are provided in Appendix E. The results demonstrate that sound levels meet the criteria with the inclusion of the mitigation measures included for the internal stationary assessment.

Therefore, with the inclusion of the mitigation measures described above the emergency generator stationary sound levels will be compliant with the applicable sound level criteria for all PORs.

5.0 Noise Mitigation Measures

Based on the predicted sound levels it was determined that noise mitigation measures are required for Centre Wellington Operations Centre.

5.1 Internal Stationary Noise Mitigation Requirements

The assessment of the proposed Centre Wellington Operations Centre's internal stationary sources determined that the following noise mitigation measures were required to meet the applicable MECP noise standards:

An acoustic barrier along the south-west property line is proposed to mitigate the noise exceedances. The acoustic barrier is 2.6 m tall along the most southern 190 m of the property line. The northern 245 m of the south-west property line requires a shorter barrier of 2.2 m tall. Both barriers are proposed to sit atop a 2.5 m earth berm, constructed at a 3:1 slope within the 15 m allowance.

Acoustical barriers must be constructed in a structurally sound manner, designed to withstand wind and snow loading. The barrier must have a minimum surface density of 20 kg/m². The barrier must be constructed without cracks or surface gaps. Any gaps that are under the barriers that are necessary for drainage purposes should be localized and minimized, so that the acoustical performance of the barrier is maintained.

6.0 Implementation Procedures

The following implementation procedures are recommended to ensure that each requirement of this study is implemented at the correct stage of the development process:

- Prior to Issuance of Building Permit an Acoustical Consultant should be retained to review the shop drawings of the required acoustic barriers. Improperly constructed acoustic barriers can result in the developer being required to repair or replace the barrier in order to receive a certification of completion for the development's acoustic requirements.

Prior to operations beginning at the site, an acoustic engineer should confirm that the acoustic barrier and berm have been properly constructed.

7.0 Conclusion

The results of Centre Wellington Operations Centre Noise Impact Assessment demonstrate that if all noise mitigation measures prescribed in section 5.1 are implemented, the sound levels will meet the MECP noise guideline requirements. The Implementation Procedures of Section 6.0 should be followed carefully to ensure that no requirements of the noise study are overlooked.

8.0 References

Environmental Noise Guideline. Stationary and Transportation Sources – Approval and Planning. Publication NPC-300. Ministry of the Environment, Conservation and Parks, August 2013 (released October 21, 2013).



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Tables

Table 1: Applicable Stationary Sound Level Criteria

POR #	Time of Day	Ambient Sound Level	NPC-300 Exclusion Limit	Applicable Sound Level Criteria
POR01	Daytime	-	50 dBA	50 dBA
	Evening	-	50 dBA	50 dBA
	Nighttime	-	45 dBA	45 dBA
POR02	Daytime	-	50 dBA	50 dBA
	Evening	-	50 dBA	50 dBA
	Nighttime	-	45 dBA	45 dBA
POR03	Daytime	-	50 dBA	50 dBA
	Evening	-	50 dBA	50 dBA
	Nighttime	-	45 dBA	45 dBA
POR04	Daytime	-	50 dBA	50 dBA
	Evening	-	50 dBA	50 dBA
	Nighttime	-	45 dBA	45 dBA
POR05	Daytime	-	50 dBA	50 dBA
	Evening	-	50 dBA	50 dBA
	Nighttime	-	45 dBA	45 dBA
OPOR01	Daytime	-	50 dBA	50 dBA
	Evening	-	50 dBA	50 dBA
	Nighttime	-	-	-
OPOR02	Daytime	-	50 dBA	50 dBA
	Evening	-	50 dBA	50 dBA
	Nighttime	-	-	-
OPOR03	Daytime	-	50 dBA	50 dBA
	Evening	-	50 dBA	50 dBA
	Nighttime	-	-	-
OPOR04	Daytime	-	50 dBA	50 dBA
	Evening	-	50 dBA	50 dBA
	Nighttime	-	-	-
OPOR05	Daytime	-	50 dBA	50 dBA
	Evening	-	50 dBA	50 dBA
	Nighttime	-	-	-

Table 2: Predicted Internal Stationary Sound Levels (Unmitigated)

POR #	Time of Day	Impact	Criteria	Compliance?
POR01	Daytime	47 dBA	50 dBA	Yes
	Evening	43 dBA	50 dBA	Yes
	Nighttime	42 dBA	45 dBA	Yes
POR02	Daytime	55 dBA	50 dBA	No
	Evening	46 dBA	50 dBA	Yes
	Nighttime	45 dBA	45 dBA	Yes
POR03	Daytime	55 dBA	50 dBA	No
	Evening	49 dBA	50 dBA	Yes
	Nighttime	48 dBA	45 dBA	No
POR04	Daytime	54 dBA	50 dBA	No
	Evening	48 dBA	50 dBA	Yes
	Nighttime	48 dBA	45 dBA	No
POR05	Daytime	49 dBA	50 dBA	Yes
	Evening	44 dBA	50 dBA	Yes
	Nighttime	43 dBA	45 dBA	Yes
OPOR01	Daytime	48 dBA	50 dBA	Yes
	Evening	44 dBA	50 dBA	Yes
	Nighttime	-	-	-
OPOR02	Daytime	56 dBA	50 dBA	No
	Evening	44 dBA	50 dBA	Yes
	Nighttime	-	-	-
OPOR03	Daytime	55 dBA	50 dBA	No
	Evening	49 dBA	50 dBA	Yes
	Nighttime	-	-	-
OPOR04	Daytime	54 dBA	50 dBA	No
	Evening	48 dBA	50 dBA	Yes
	Nighttime	-	-	-
OPOR05	Daytime	50 dBA	50 dBA	Yes
	Evening	48 dBA	50 dBA	Yes
	Nighttime	-	-	-

Table 3: Predicted Internal Stationary Sound Levels (Mitigated)

POR #	Time of Day	Impact	Criteria	Compliance?
POR01	Daytime	46 dBA	50 dBA	Yes
	Evening	43 dBA	50 dBA	Yes
	Nighttime	41 dBA	45 dBA	Yes
POR02	Daytime	50 dBA	50 dBA	Yes
	Evening	46 dBA	50 dBA	Yes
	Nighttime	44 dBA	45 dBA	Yes
POR03	Daytime	50 dBA	50 dBA	Yes
	Evening	45 dBA	50 dBA	Yes
	Nighttime	44 dBA	45 dBA	Yes
POR04	Daytime	49 dBA	50 dBA	Yes
	Evening	43 dBA	50 dBA	Yes
	Nighttime	43 dBA	45 dBA	Yes
POR05	Daytime	50 dBA	50 dBA	Yes
	Evening	44 dBA	50 dBA	Yes
	Nighttime	43 dBA	45 dBA	Yes
OPOR01	Daytime	44 dBA	50 dBA	Yes
	Evening	39	50 dBA	Yes
	Nighttime	-	-	Yes
OPOR02	Daytime	48 dBA	50 dBA	Yes
	Evening	39 dBA	50 dBA	Yes
	Nighttime	-	-	Yes
OPOR03	Daytime	46 dBA	50 dBA	Yes
	Evening	40 dBA	50 dBA	Yes
	Nighttime	-	-	Yes
OPOR04	Daytime	45 dBA	50 dBA	Yes
	Evening	40 dBA	50 dBA	Yes
	Nighttime	-	-	Yes
OPOR05	Daytime	50 dBA	50 dBA	Yes
	Evening	44 dBA	50 dBA	Yes
	Nighttime	-	-	Yes

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Table 4: Predicted Emergency Generator Stationary Sound Levels (Mitigated)

POR #	Time of Day	Impact	Criteria	Compliance?
POR01	Daytime	50 dBA	55 dBA	Yes
POR02	Daytime	55 dBA	55 dBA	Yes
POR03	Daytime	48 dBA	55 dBA	Yes
POR04	Daytime	44 dBA	55 dBA	Yes
POR05	Daytime	30 dBA	55 dBA	Yes
OPOR01	Daytime	49 dBA	55 dBA	Yes
OPOR02	Daytime	53 dBA	55 dBA	Yes
OPOR03	Daytime	46 dBA	55 dBA	Yes
OPOR04	Daytime	45 dBA	55 dBA	Yes
OPOR05	Daytime	30 dBA	55 dBA	Yes

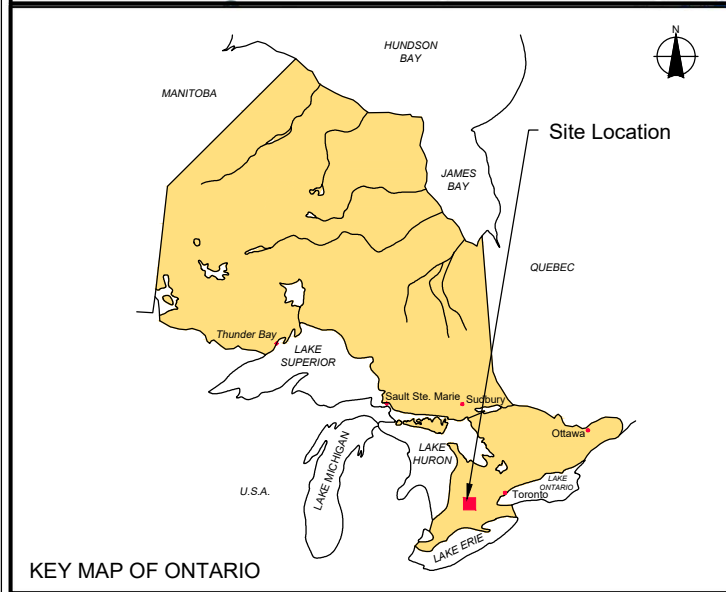
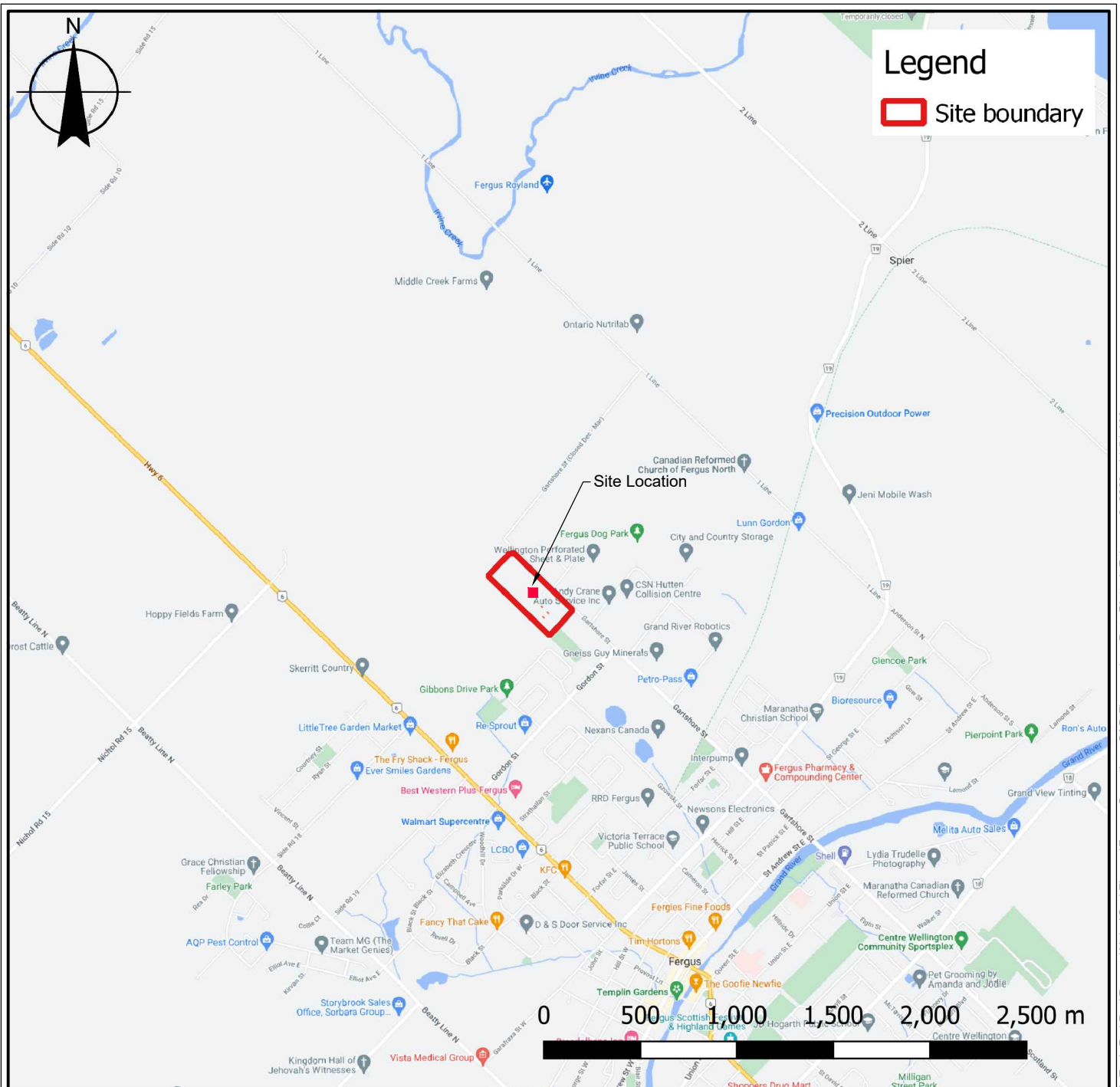


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Figures

Figures




			
Client			
Township of Centre Wellington			
Figure Title			
Site Location Map			
Centre Wellington Operations Centre			
Drawn	Checked	Date	Figure No.
BM	HW	February 2023	1
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Site Location



		Figure Title			
		<h2>Zoning Map</h2> <p>Centre Wellington Operations Centre</p>			
Client	<h3>Township of Centre Wellington</h3>	Drawn	Checked	Date	Figure No.
		BM	HW	February 2023	
		Scale	Project No.		2
		N/A	300055234.0000		



Legend

- Site boundary
- Buildings
- Sensitive Receptors

Conceptual Site Plan for
 Operations Centre
 990 Constance St. Fergus
 January 24, 2023

TOTAL SITE AREA:
 8,426 m² (20.8 acres)


Operations Building
 Ph. 1, 3,800 m² (36,321 ft²)
 expansion
 Admin 121 19m² (1,298 ft²)
 Ph. 2, 1,228m²
 Ph. 3, 250m²

Total Building: 5,278 m² (56,947 ft²)

Vehicle storage pole barn
 Ph. 1, 230 m² (2,492 ft²)
 expansion 250m²

Future Salt & Sand shed including
 induct loading
 1,951 m² (21,000 ft²)

Greenhouse:
 124 m² each (1,339 ft²)



Client

Township of Centre Wellington

Figure Title Stationary Noise - Points of Reception Centre Wellington Operations Centre			
Drawn BM	Checked HW	Date February 2023	Figure No. 4
Scale 1:3500	Project No. 300055234.0000		

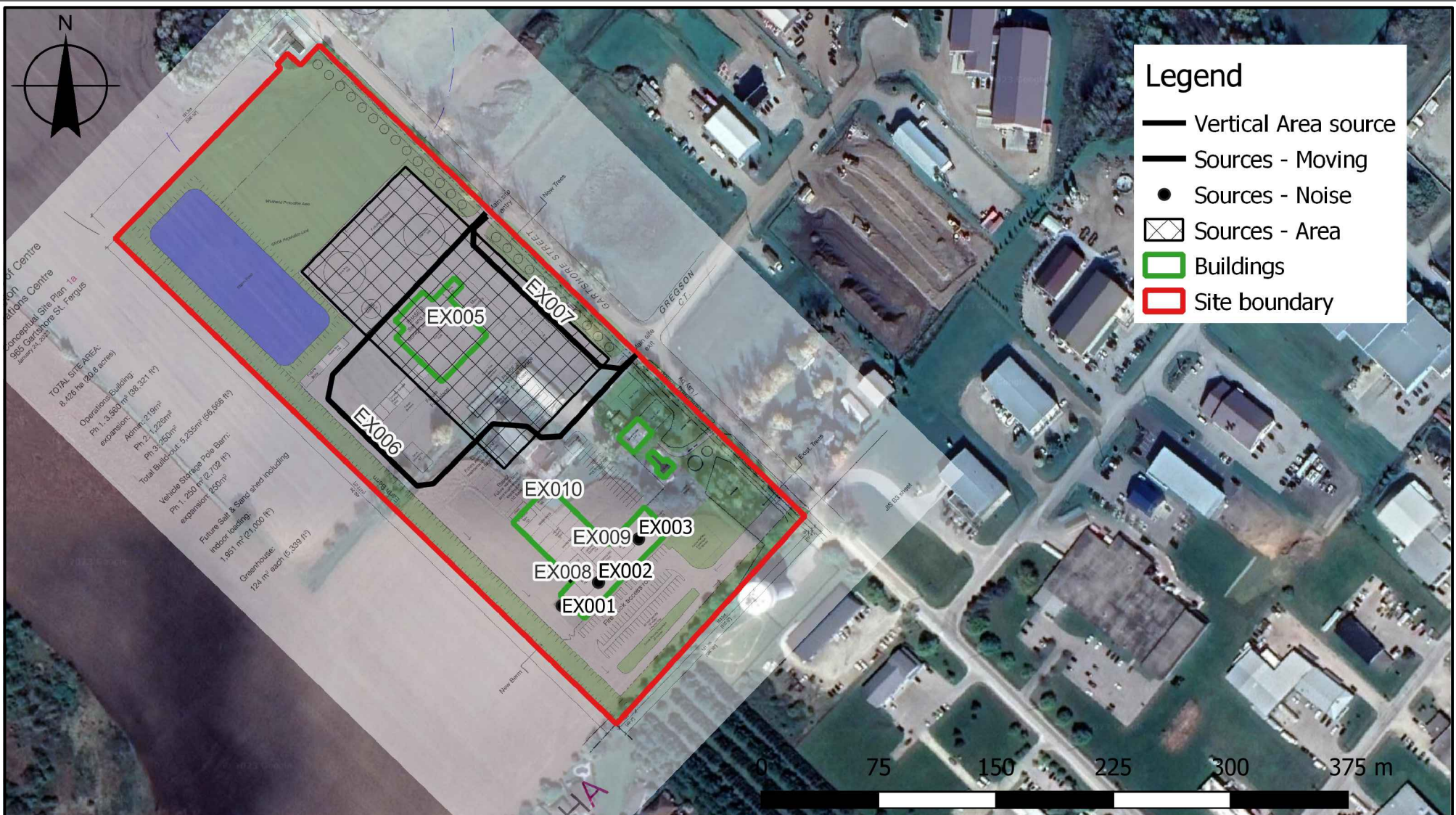


Figure Title
Internal Stationary Noise Sources
 Centre Wellington Operations Centre

Client
Township of Centre Wellington

Drawn BM	Checked HW	Date February 2023	Figure No. 5
Scale 1:3500	Project No. 300055234.0000		

Figure 7: Unmitigated Evening Internal Stationary Noise
 Internal Stationary Noise Model - unmitigated
 9 Feb 2023, 09:35

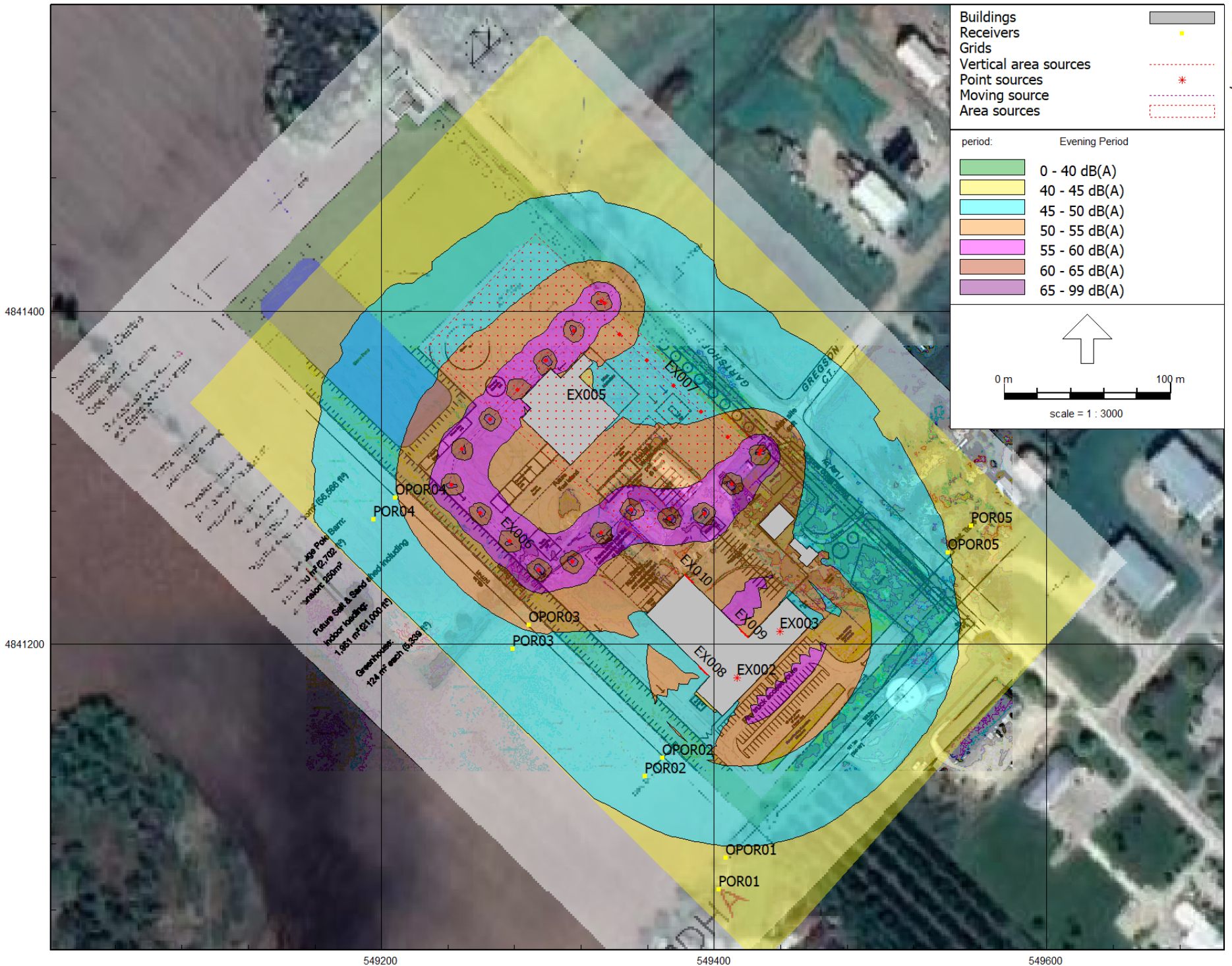


Figure 9 : Mitigated Daytime Internal Stationary Noise
 Internal Stationary Noise Model - final split barrier model
 9 Feb 2023, 08:42

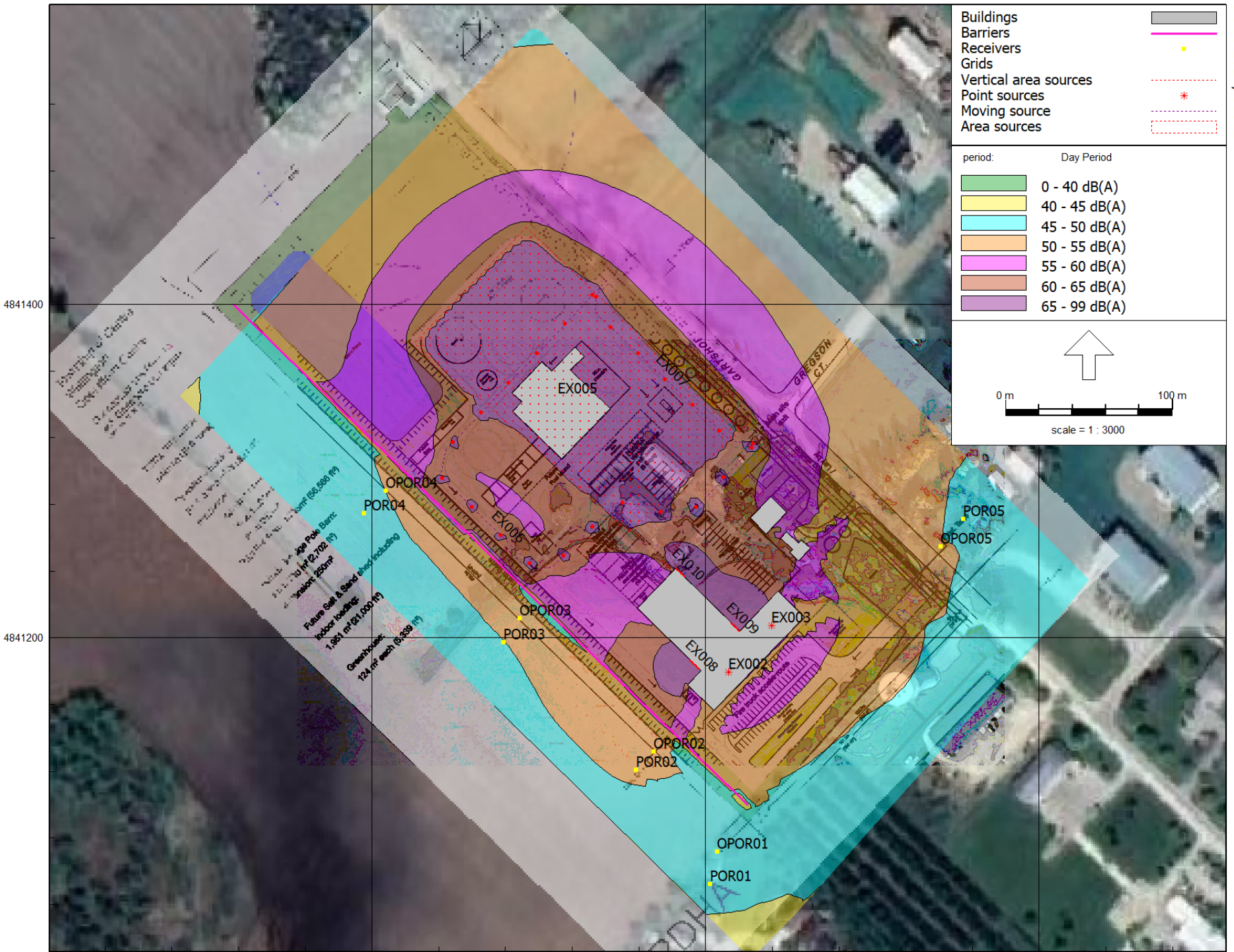
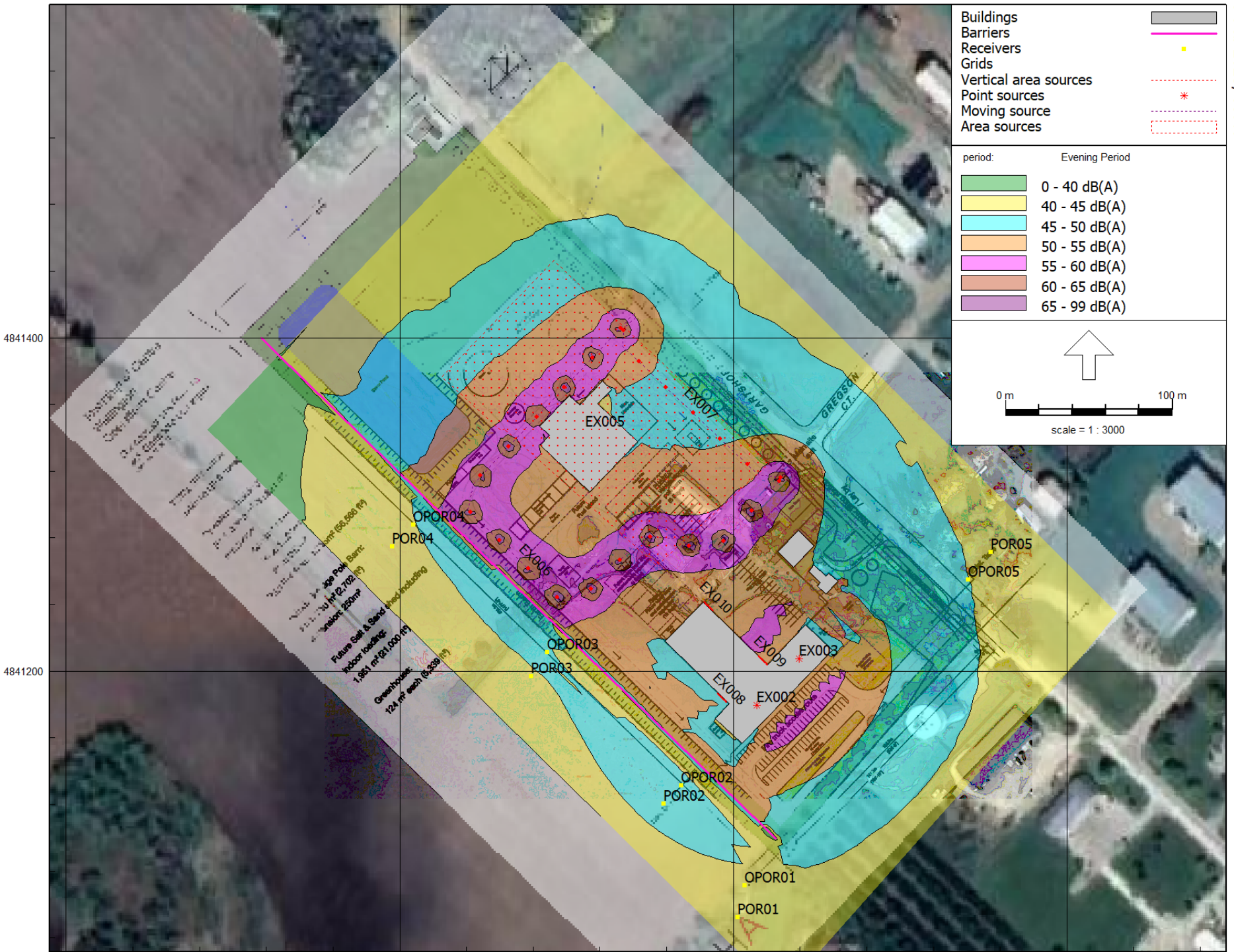
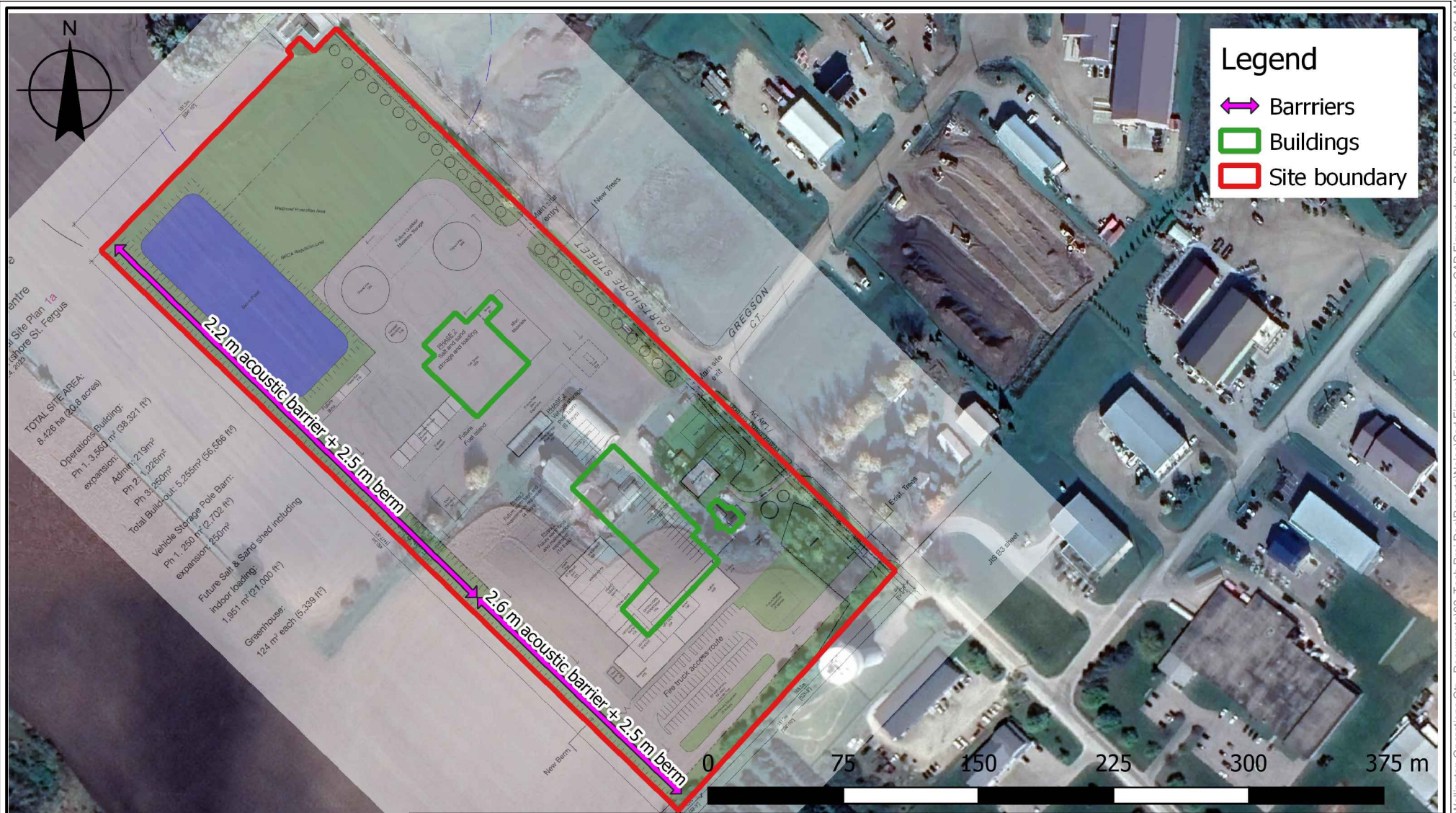



Figure 10: Mitigated Evening Internal Stationary Noise
 Internal Stationary Noise Model - final split barrier model
 9 Feb 2023, 08:46





		Figure Title			
		Noise Mitigation Measures - Barrier Alignments Centre Wellington Operations Centre			
Client	Township of Centre Wellington	Drawn	Checked	Date	Figure No.
		BM	HW	February 2023	
		Scale	Project No.		12
		1:3500	300055234.0000		



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Appendix A

MECP Sound Level Limits

APPENDIX A

Summary of the traffic data:

APPENDIX A**Table A-1: Sound Level Limit for Outdoor Living Areas – Road and Rail**

Time Period	Leq(16)(dBA)
16-hour, 07:00 – 23:00	55

Table A-2: Indoor Sound Level Limits – Road and Rail

Type of Space	Time Period	Leq (dBA)	
		Road	Rail
Living/dining, den areas of residences, hospitals, nursing homes, schools, daycare centres, etc.	07:00 – 23:00	45	40
Living/dining, den areas of residences, hospitals, nursing homes, etc. (except schools or daycare centres)	23:00 – 07:00	45	40
Sleeping quarters	07:00 – 23:00	45	40
Sleeping quarters	23:00 – 07:00	40	35

Table A-3: Road Noise Control Measures – Outdoor Living Areas

Sound Levels	Measures
≤ 55 dBA	Noise control measures may not be required.
> 55 dBA and ≤ 60 dBA	Noise control measures may be applied, otherwise warning clause Type A.
> 60 dBA	Noise control measures should be implemented to reduce the levels to 55 dBA, otherwise warning clause Type B.

Table A-4: Plane of a Window – Ventilation Requirements
Daytime Period, 07:00 – 23:00 Hours

Sound Levels	Measures
≤ 55 dBA	Noise control measures may not be required.
> 55 dBA and ≤ 65 dBA	The dwelling should be designed with a provision of for the installation of central air conditioning in the future, at the occupant's discretion. Warning clause Type C is also recommended.
> 65 dBA	Installation of central air conditioning should be implemented with a warning clause Type D. In addition, building components including windows, walls and doors, where applicable, should be designed so that the indoor sound levels comply with the sound level limits in Table B-2.

**Table A-5: Plane of a Window – Ventilation Requirements
Nighttime Period, 23:00 – 07.00 Hours**

Sound Levels	Measures
≤ 50 dBA	Noise control measures may not be required.
> 50 dBA and ≤ 60 dBA	The dwelling should be designed with a provision of for the installation of central air conditioning in the future, at the occupant's discretion. Warning clause Type C is also recommended.
> 60 dBA	Installation of central air conditioning should be implemented with a warning clause Type D. In addition, building components including windows, walls and doors, where applicable, should be designed so that the indoor sound levels comply with the sound level limits in Table B-2.

Table A-6: Indoor Living Areas – Building Components

Sound Levels	Measures
> 60 dBA nighttime > 65 dBA daytime	Building components including windows, walls and doors, where applicable, should be designed so that the indoor sound levels comply with the sound level limits in Table B-2. The acoustical performance of the building components (windows, doors and walls) should be specified.

Noise Impact Assessment
February 2023

Table A-7: MECP Table C-5 of NPC-300: Exclusion Limit Values of One-Hour Equivalent Sound Level (Leq, dBA) Outdoor Points of Reception

Time of Day	Class 1 Area	Class 2 Area	Class 3 Area	Class 4 Area
07:00 – 19:00	50 dBA	50 dBA	45 dBA	55 dBA
19:00 – 23:00	50 dBA	45 dBA	40 dBA	55 dBA

Noise Impact Assessment
February 2023

Table A-8: MECP Table C-6 of NPC-300: Exclusion Limit Values of One-Hour Equivalent Sound Level (Leq, dBA) Plane of Window of Noise Sensitive Spaces

Time of Day	Class 1 Area	Class 2 Area	Class 3 Area	Class 4 Area
07:00 – 19:00	50 dBA	50 dBA	45 dBA	60 dBA
19:00 – 23:00	50 dBA	50 dBA	40 dBA	60 dBA
23:00 – 07:00	45 dBA	45 dBA	40 dBA	55 dBA

Noise Impact Assessment
February 2023

Table A-9: MECP Table C-7 of NPC-300: Exclusion Limit Values of Impulsive Sound Level (LLM, dBA) Outdoor Points of Reception

Time of Day	Actual number of impulses in Period of one hour	Class 1 Area	Class 2 Area	Class 3 Area	Class 4 Area
07:00 – 23:00	9 or more	50	50	45	55
07:00 – 23:00	7 to 8	55	55	50	60
07:00 – 23:00	5 to 6	60	60	55	65
07:00 – 23:00	4	65	65	60	70
07:00 – 23:00	3	70	70	65	75
07:00 – 23:00	2	75	75	70	80
07:00 – 23:00	1	80	80	75	85

Noise Impact Assessment
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Table A-10: MECP Table C-8 of NPC-300: Exclusion Limit Values of Impulsive Sound Level (LLM, dBA) Plane of Window – Noise Sensitive Spaces (Day/Night)

Actual number of impulses in Period of one hour	Class 1 Area (7:00-23:00) / (23:00-7:00)	Class 2 Area (7:00-23:00) / (23:00-7:00)	Class 3 Area (7:00-19:00) / (19:00-7:00)	Class 4 Area (7:00-23:00) / (23:00-7:00)
9 or more	50/45	50/45	45/40	60/55
7 to 8	55/50	55/50	50/45	65/60
5 to 6	60/55	60/55	55/50	70/65
4	65/60	65/60	60/55	75/70
3	70/65	70/65	65/60	80/75
2	75/70	75/70	70/65	85/80
1	80/75	80/75	75/70	90/85



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Appendix B

Sample Unmitigated Internal Stationary Noise Modeling Printouts

Appendix B: Predictor Inputs

Area Source Limit of 20
Group

1 --

Item ID	Grp ID	Date	1st Kid	Kid Cnl	Name Desc.	Shape	X1	Y1	Height	Rel.H
207	0	#####	-61	650	EX005 Front End I	Polygon	549262.7	4841345	1.5	1.5

Moving Source Limit of 20
Group

1 --

2 --

Item ID	Grp ID	Date	1st Kid	Kid Cnl	Name Desc.	Shape	X1	Y1	Xn	Yn
208	0	#####	-37	17	EX006 Trucking M	Polyline	549340.7	4841415	549435.9	4841323
209	0	#####	-54	7	EX007 Fuel Truck:	Polyline	549341.5	4841412	549436.8	4841324

Point Source Limit of 100
Group

1 --

2 --

Item ID	Grp ID	Date	Name	Desc.	Shape	X	Y	Height	Rel.H	Abs.H	Terrain L
211	0	#####	EX002	EX002 Point		549413.9	4841180	1.5	1.5	7.5	6
212	0	#####	EX003	EX003 Point		549439.6	4841208	1.5	1.5	7.5	6

Vertical_Area :Limit of 20
Group

1 --

2 --

3 --

Item ID	Grp ID	Date	1st Kid	Kid Cnl	Name Desc.	Shape	X1	Y1	Xn	Yn
228	0	#####	-2456	136	EX008 Mechanica	Line	549390.9	4841186	549396.1	4841181
229	0	#####	-2728	136	EX010 Car Wash I	Line	549382.7	4841241	549387.9	4841236
230	0	#####	-2592	136	EX009 Mechanica	Line	549415.4	4841209	549420.6	4841204

Grid Limit of 20
Group

1 --

Item ID	Grp ID	Date	1st Kid	Kid Cnl	Name Desc.	Shape	X1	Y1	Height	Rel.H
233	0	#####	-2865	5894	Grid	Polygon	549298.2	4841570	4.5	4.5

Receiver Limit of 88
Group

1 --

2 --

3 --

4 --

5 --

6 --

7 --

8 --

9 --

10 --

Item ID	Grp ID	Date	1st Kid	Kid Cnl	Name Desc.	Shape	X	Y	Terrain L	HDef.
214	0	#####	-2161	2	POR01POR01	Point	549402.8	4841052	0	Relative
215	0	#####	-2167	1	OPOR(OPOR01	Point	549406.9	4841072	0	Relative
216	0	#####	-2173	2	POR02POR02	Point	549358.4	4841121	0	Relative
217	0	#####	-2179	1	OPOR(OPOR02	Point	549368.9	4841131	0	Relative
218	0	#####	-2185	2	POR03POR03	Point	549278.8	4841197	0	Relative
219	0	#####	-2191	1	OPOR(OPOR03	Point	549288.6	4841211	0	Relative
220	0	#####	-2197	2	POR04POR04	Point	549195.4	4841275	0	Relative
221	0	#####	-2203	1	OPOR(OPOR04	Point	549208.2	4841288	0	Relative
222	0	#####	-2209	2	POR05POR05	Point	549554.5	4841271	0	Relative
223	0	#####	-2215	1	OPOR(OPOR05	Point	549540.9	4841255	0	Relative

Vertical Grid Limit of 20
Group

Item ID	Grp ID	Date	1st Kid	Kid Cnl	Name Desc.	Shape	X1	Y1	Xn	Yn
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Barrier Limit of 20
Group

Item ID	Grp ID	Date	1st Kid	Kid Cnl	Name Desc.	Shape	X1	Y1	Xn	Yn
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Building Limit of 100
Group

1 --

2 --

3 --

4 --

5 --

6 --

7 --

8 --

Item ID	Grp ID	Date	Name	Desc.	Shape	X1	Y1	Height	Rel.H	Abs.H	Terrain L
199	0	#####			Polygoi	613951.2	4850138	0	0	0	0
200	0	#####			Polygoi	613946.1	4850143	0	0	0	0
201	0	#####			Polygoi	613898.5	4850147	0	0	0	0
202	0	#####			Polygoi	613928.9	4850223	0	0	0	0
203	0	#####			Polygoi	549301.8	4841365	9	9	9	0
204	0	#####			Polygoi	549359.1	4841218	6	6	6	0
205	0	#####			Polygoi	549445.2	4841260	6	6	6	0
206	0	#####			Polygoi	549426.8	4841272	3	3	3	0

Day Limit 100 Sources, 88 PORs

Group / source	[dB]	Reduct		POR01		POR01_POR01		OPOR1		OPOR01_		POR02_A		POR02_B		OPOR02_	
		result	corr.	result	corr.	result	corr.	result	corr.	result	corr.	result	corr.	result	corr.	result	corr.
EX005 - Front End Loa...	0	41.8	41.8	42.3	42.3	41.7	41.7	46.1	46.1	46.2	46.2	45.8	45.8				
EX006 - Trucking Mov...	0	34.6	34.6	36.7	36.7	35	35	38.1	38.1	40.4	40.4	38.4	38.4				
EX007 - Fuel Trucks	0	15.8	15.8	18.7	18.7	15.7	15.7	19.6	19.6	22.3	22.3	17.8	17.8				
EX002 - EX002	0	41	41	41.3	41.3	42.4	42.4	41.1	41.1	45.6	45.6	42.6	42.6				
EX003 - EX003	0	39.1	39.1	39.2	39.2	40.2	40.2	37.1	37.1	37.6	37.6	37.1	37.1				
EX008 - Mechanical Sh...	0	39.8	39.8	39.3	39.3	40.6	40.6	53.2	53.2	53.1	53.1	54.7	54.7				
EX010 - Car Wash Noise	0	22.4	22.4	24.9	24.9	22.4	22.4	18.5	18.5	18.7	18.7	19.3	19.3				
EX009 - Mechanical Sh...	0	30.9	30.9	30.4	30.4	31.9	31.9	33.6	33.6	33.7	33.7	34.7	34.7				
Total		47	47	47.3	47.3	47.7	47.7	54.4	54.4	54.8	54.8	55.6	55.6				
(no category)	--	--	--	--	--	--	--	--	--	--	--	--	--				
Exceeding	--	--	--	--	--	--	--	--	--	--	--	--	--				
Exceeding	--	--	--	--	--	--	--	--	--	--	--	--	--				

Evening Limit 100 Sources

Group / source	[dB]	Reduct		POR01		POR01_POR01		OPOR1		OPOR01_		POR02_A		POR02_B		OPOR02_	
		result	corr.	result	corr.	result	corr.	result	corr.	result	corr.	result	corr.	result	corr.	result	corr.
EX005 - Front End Loa...	0	--	--	--	--	--	--	--	--	--	--	--	--				
EX006 - Trucking Mov...	0	34.6	34.6	36.7	36.7	35	35	38.1	38.1	40.4	40.4	38.4	38.4				
EX007 - Fuel Trucks	0	--	--	--	--	--	--	--	--	--	--	--	--				
EX002 - EX002	0	39.8	39.8	40.1	40.1	41.2	41.2	39.8	39.8	44.4	44.4	41.4	41.4				
EX003 - EX003	0	37.8	37.8	38	38	39	39	35.8	35.8	36.4	36.4	35.8	35.8				
EX008 - Mechanical Sh...	0	--	--	--	--	--	--	--	--	--	--	--	--				
EX010 - Car Wash Noise	0	--	--	--	--	--	--	--	--	--	--	--	--				
EX009 - Mechanical Sh...	0	--	--	--	--	--	--	--	--	--	--	--	--				
Total		42.7	42.7	43.2	43.2	43.8	43.8	43	43	46.3	46.3	43.9	43.9				
(no category)	--	--	--	--	--	--	--	--	--	--	--	--	--				
Exceeding	--	--	--	--	--	--	--	--	--	--	--	--	--				
Exceeding	--	--	--	--	--	--	--	--	--	--	--	--	--				

Night Limit 100 Sources

Group / source	[dB]	Reduct		POR01		POR01_POR01		OPOR1		OPOR01_		POR02_A		POR02_B		OPOR02_	
		result	corr.	result	corr.	result	corr.	result	corr.	result	corr.	result	corr.	result	corr.	result	corr.
EX005 - Front End Loa...	0	--	--	--	--	--	--	--	--	--	--	--	--				
EX006 - Trucking Mov...	0	34.6	34.6	36.7	36.7	35	35	38.1	38.1	40.4	40.4	38.4	38.4				
EX007 - Fuel Trucks	0	--	--	--	--	--	--	--	--	--	--	--	--				
EX002 - EX002	0	38	38	38.3	38.3	39.4	39.4	38.1	38.1	42.6	42.6	39.6	39.6				
EX003 - EX003	0	36.1	36.1	36.2	36.2	37.2	37.2	34.1	34.1	34.6	34.6	34	34				
EX008 - Mechanical Sh...	0	--	--	--	--	--	--	--	--	--	--	--	--				
EX010 - Car Wash Noise	0	--	--	--	--	--	--	--	--	--	--	--	--				
EX009 - Mechanical Sh...	0	--	--	--	--	--	--	--	--	--	--	--	--				
Total		41.2	41.2	41.9	41.9	42.3	42.3	41.9	41.9	45.1	45.1	42.7	42.7				
(no category)	--	--	--	--	--	--	--	--	--	--	--	--	--				
Exceeding	--	--	--	--	--	--	--	--	--	--	--	--	--				
Exceeding	--	--	--	--	--	--	--	--	--	--	--	--	--				

Limit of 88

Description	X	Y	Height	Day	Evening	Night	Li
POR05	5E+05	5E+06	4.5	49.4	44.1	43.1	58.9
POR05	5E+05	5E+06	1.5	49	42.4	41.2	56.4
POR04	5E+05	5E+06	4.5	53.5	47.8	47.7	64.1
POR04	5E+05	5E+06	1.5	53.1	45.9	45.8	62.3
POR03	5E+05	5E+06	4.5	54.7	48.5	48.2	64.5
POR03	5E+05	5E+06	1.5	54.4	46.7	46.4	62.9
POR02	5E+05	5E+06	4.5	54.8	46.3	45	60.1
POR02	5E+05	5E+06	1.5	54.4	43	41.9	58.9
POR01	5E+05	5E+06	4.5	47.3	43.2	41.9	54.5
POR01	5E+05	5E+06	1.5	47	42.7	41.2	52.8



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Appendix C

Sample Mitigated Internal Stationary Noise Modeling Printouts

Appendix C: Predictor Inputs

Area Source Limit of 20
Group

1 --

Item ID	Grp ID	Date	1st Kid	Kid Cnl	Name Desc.	Shape	X1	Y1	Height	Rel.H
207	0	#####	-61	650	EX005 Front End I	Polygon	549262.7	4841345	1.5	1.5

Moving Source Limit of 20
Group

1 --

2 --

Item ID	Grp ID	Date	1st Kid	Kid Cnl	Name Desc.	Shape	X1	Y1	Xn	Yn
208	0	#####	-37	17	EX006 Trucking M	Polyline	549340.7	4841415	549435.9	4841323
209	0	#####	-54	7	EX007 Fuel Truck:	Polyline	549341.5	4841412	549436.8	4841324

Point Source Limit of 100
Group

1 --

2 --

Item ID	Grp ID	Date	Name	Desc.	Shape	X	Y	Height	Rel.H	Abs.H	Terrain L
211	0	#####	EX002	EX002 Point		549413.9	4841180	1.5	1.5	7.5	6
212	0	#####	EX003	EX003 Point		549439.6	4841208	1.5	1.5	7.5	6

Vertical_Area :Limit of 20
Group

1 --

2 --

3 --

Item ID	Grp ID	Date	1st Kid	Kid Cnl	Name Desc.	Shape	X1	Y1	Xn	Yn
228	0	#####	-2456	136	EX008 Mechanica	Line	549390.9	4841186	549396.1	4841181
229	0	#####	-2728	136	EX010 Car Wash I	Line	549382.7	4841241	549387.9	4841236
230	0	#####	-2592	136	EX009 Mechanica	Line	549415.4	4841209	549420.6	4841204

Grid Limit of 20
Group

1 --

Item ID	Grp ID	Date	1st Kid	Kid Cnl	Name Desc.	Shape	X1	Y1	Height	Rel.H
233	0	#####	-2865	5894	Grid	Polygon	549298.2	4841570	4.5	4.5

Receiver Limit of 88
Group

1 --

2 --

3 --

4 --

5 --

6 --

7 --

8 --

9 --

10 --

Item ID	Grp ID	Date	1st Kid	Kid Cnl	Name Desc.	Shape	X	Y	Terrain L	HDef.
214	0	#####	-2161	2	POR01POR01	Point	549402.8	4841052	0	Relative
215	0	#####	-2167	1	OPOR(OPOR01	Point	549406.9	4841072	0	Relative
216	0	#####	-2173	2	POR02POR02	Point	549358.4	4841121	0	Relative
217	0	#####	-2179	1	OPOR(OPOR02	Point	549368.9	4841131	0	Relative
218	0	#####	-2185	2	POR03POR03	Point	549278.8	4841197	0	Relative
219	0	#####	-2191	1	OPOR(OPOR03	Point	549288.6	4841211	0	Relative
220	0	#####	-2197	2	POR04POR04	Point	549195.4	4841275	0	Relative
221	0	#####	-2203	1	OPOR(OPOR04	Point	549208.2	4841288	0	Relative
222	0	#####	-2209	2	POR05POR05	Point	549554.5	4841271	0	Relative
223	0	#####	-2215	1	OPOR(OPOR05	Point	549540.9	4841255	0	Relative

Vertical Grid Limit of 20
Group

Item ID	Grp ID	Date	1st Kid	Kid Cnl	Name Desc.	Shape	X1	Y1	Xn	Yn
---------	--------	------	---------	---------	------------	-------	----	----	----	----

Barrier Limit of 20
Group

1 --

2 --

Item ID	Grp ID	Date	1st Kid	Kid Cnl	Name Desc.	Shape	X1	Y1	Xn	Yn
224	0	#####	-2221	1		Polyline	549290.1	4841231	549425.4	4841100
231	0	#####	-2864	1		Polyline	549290.2	4841231	549117	4841400

Building Limit of 100
Group

1 --

2 --

3 --

4 --

5 --

6 --

7 --

8 --

Item ID	Grp ID	Date	Name	Desc.	Shape	X1	Y1	Height	Rel.H	Abs.H	Terrain L
199	0	#####			Polygoi	613951.2	4850138	0	0	0	0
200	0	#####			Polygoi	613946.1	4850143	0	0	0	0
201	0	#####			Polygoi	613898.5	4850147	0	0	0	0
202	0	#####			Polygoi	613928.9	4850223	0	0	0	0
203	0	#####			Polygoi	549301.8	4841365	9	9	9	0
204	0	#####			Polygoi	549359.1	4841218	6	6	6	0
205	0	#####			Polygoi	549445.2	4841260	6	6	6	0
206	0	#####			Polygoi	549426.8	4841272	3	3	3	0

Day Limit 100 Sources, 88 PORs

Group / source	[dB]	ReductPOR01		POR01_POR01		POR01OPOR1		OPOR01_/POR02_A		POR02_A		POR02_B		POR02_B		OPOR02_/OPOR02_	
		result	corr.	result	corr.	result	corr.	result	corr.	result	corr.	result	corr.	result	corr.	result	corr.
EX005 - Front End Loa...	0	37.9	37.9	39.1	39.1	37.5	37.5	39.8	39.8	42	42	42	42	38.1	38.1	38.1	38.1
EX006 - Trucking Mov...	0	30.5	30.5	33	33	30.7	30.7	32.9	32.9	36	36	36	36	32.5	32.5	32.5	32.5
EX007 - Fuel Trucks	0	14.7	14.7	18.6	18.6	13.7	13.7	14.7	14.7	20	20	20	20	11	11	11	11
EX002 - EX002	0	37.2	37.2	41.3	41.3	38.1	38.1	39.9	39.9	45.6	45.6	45.6	45.6	38.6	38.6	38.6	38.6
EX003 - EX003	0	35.2	35.2	39.2	39.2	35.2	35.2	33.5	33.5	37.6	37.6	37.6	37.6	30.8	30.8	30.8	30.8
EX008 - Mechanical Sh...	0	36.9	36.9	37.6	37.6	37.8	37.8	44.8	44.8	46.6	46.6	46.6	46.6	45.7	45.7	45.7	45.7
EX010 - Car Wash Noise	0	19.3	19.3	24.9	24.9	18.6	18.6	17.9	17.9	18.5	18.5	18.5	18.5	18.9	18.9	18.9	18.9
EX009 - Mechanical Sh...	0	29.6	29.6	30.4	30.4	30.5	30.5	32.7	32.7	33.7	33.7	33.7	33.7	33.6	33.6	33.6	33.6
Total		43.4	43.4	45.9	45.9	43.8	43.8	47.5	47.5	50.4	50.4	50.4	50.4	47.5	47.5	47.5	47.5
(no category)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Exceeding	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Exceeding	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Evening Limit 100 Sources

Group / source	[dB]	ReductPOR01		POR01_POR01		POR01OPOR1		OPOR01_/POR02_A		POR02_A		POR02_B		POR02_B		OPOR02_/OPOR02_	
		result	corr.	result	corr.	result	corr.	result	corr.	result	corr.	result	corr.	result	corr.	result	corr.
EX005 - Front End Loa...	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
EX006 - Trucking Mov...	0	30.5	30.5	33	33	30.7	30.7	32.9	32.9	36	36	36	36	32.5	32.5	32.5	32.5
EX007 - Fuel Trucks	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
EX002 - EX002	0	35.9	35.9	40.1	40.1	36.8	36.8	38.6	38.6	44.4	44.4	44.4	44.4	37.3	37.3	37.3	37.3
EX003 - EX003	0	34	34	38	38	34	34	32.3	32.3	36.4	36.4	36.4	36.4	29.6	29.6	29.6	29.6
EX008 - Mechanical Sh...	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
EX010 - Car Wash Noise	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
EX009 - Mechanical Sh...	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total		38.8	38.8	42.6	42.6	39.3	39.3	40.4	40.4	45.5	45.5	45.5	45.5	39.1	39.1	39.1	39.1
(no category)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Exceeding	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Exceeding	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Night Limit 100 Sources

Group / source	[dB]	ReductPOR01		POR01_POR01		POR01OPOR1		OPOR01_/POR02_A		POR02_A		POR02_B		POR02_B		OPOR02_/OPOR02_	
		result	corr.	result	corr.	result	corr.	result	corr.	result	corr.	result	corr.	result	corr.	result	corr.
EX005 - Front End Loa...	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
EX006 - Trucking Mov...	0	30.5	30.5	33	33	30.7	30.7	32.9	32.9	36	36	36	36	32.5	32.5	32.5	32.5
EX007 - Fuel Trucks	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
EX002 - EX002	0	34.2	34.2	38.3	38.3	35	35	36.9	36.9	42.6	42.6	42.6	42.6	35.6	35.6	35.6	35.6
EX003 - EX003	0	32.2	32.2	36.2	36.2	32.2	32.2	30.5	30.5	34.6	34.6	34.6	34.6	27.8	27.8	27.8	27.8
EX008 - Mechanical Sh...	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
EX010 - Car Wash Noise	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
EX009 - Mechanical Sh...	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total		37.3	37.3	41.1	41.1	37.8	37.8	39	39	44	44	44	44	37.8	37.8	37.8	37.8
(no category)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Exceeding	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Exceeding	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Limit of 88

Description	X	Y	Height	Day	Evening	Night	Li
POR05	5E+05	5E+06	4.5	49.5	44.1	43.1	58.9
POR05	5E+05	5E+06	1.5	49	42.4	41.2	56.4
POR04	5E+05	5E+06	4.5	49	43.1	42.7	58.6
POR04	5E+05	5E+06	1.5	46.2	39.6	39.2	55.2
POR03	5E+05	5E+06	4.5	50	44.7	43.9	58.9
POR03	5E+05	5E+06	1.5	46.9	40.5	39.7	55.2
POR02	5E+05	5E+06	4.5	50.4	45.5	44	55.6
POR02	5E+05	5E+06	1.5	47.5	40.4	39	52.5
POR01	5E+05	5E+06	4.5	45.9	42.6	41.1	52
POR01	5E+05	5E+06	1.5	43.4	38.8	37.3	49.3



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Appendix D

Noise Date References



LCH

**Energence® Rooftop Units
High Efficiency - 60 Hz**

**COMMERCIAL
PRODUCT SPECIFICATIONS**

Bulletin No. 210608
June 2020
Supersedes June 2019

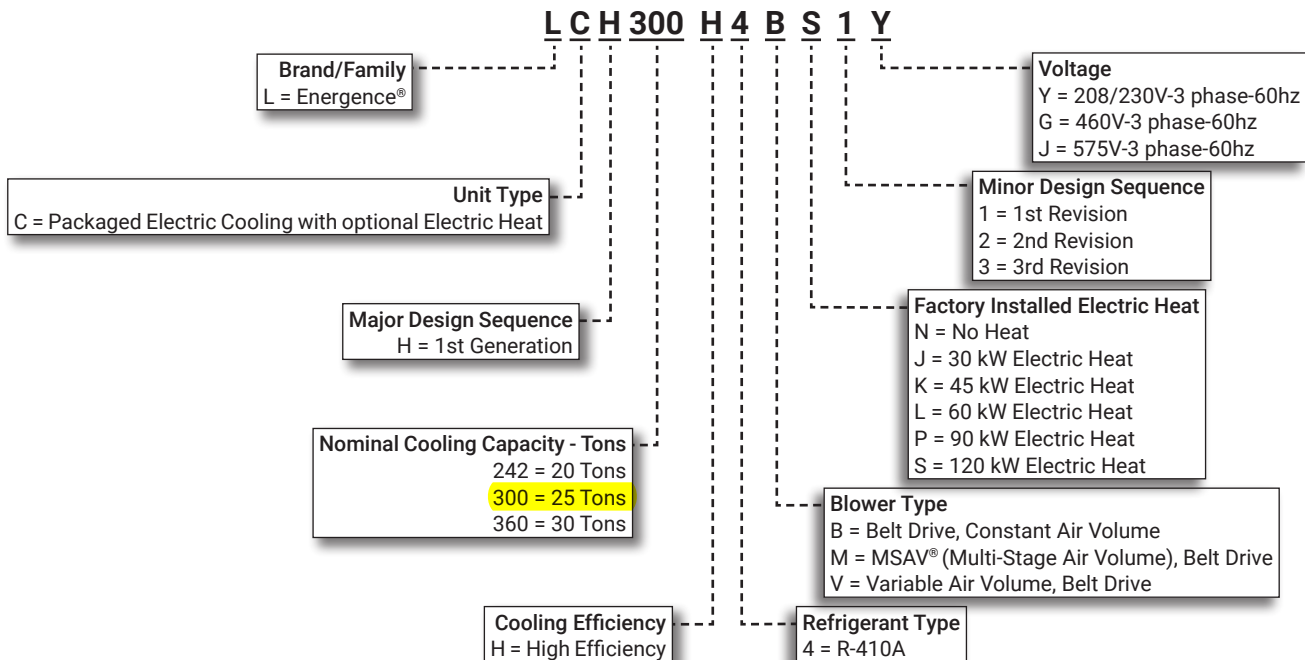


SMART WIRE™ SYSTEM



**20 to 30 Tons
Net Cooling Capacity – 238,000 to 354,000 Btuh
Optional Electric Heat - 30 to 120 kW**

MODEL NUMBER IDENTIFICATION



OUTDOOR SOUND DATA

Unit Model Number	Octave Band Sound Power Levels dBA, re 10 ⁻¹² Watts - Center Frequency - Hz							¹ Sound Rating Number (dBA)
	125	250	500	1000	2000	4000	8000	
242, 300, 360	84	85	90	90	85	80	72	95

Note - The octave band sound power data does not include tonal corrections.

¹ Tested according to AHRI Standard 370-2001 test conditions (includes pure tone penalty).

Sound Rating Number is the overall A-Weighted Sound Power Level, (LWA), dB (100 Hz to 10,000 Hz).

WEIGHT DATA

Model Number	Net		Shipping	
	lbs.	kg	lbs.	kg
242 Base Unit	2997	1359	3207	1455
242 Max. Unit	3409	1546	3619	1642
300 Base Unit	2997	1359	3207	1455
300 Max. Unit	3509	1592	3719	1687
360 Base Unit	2997	1359	3207	1455
360 Max. Unit	3509	1592	3719	1687

OPTIONS / ACCESSORIES

Description	Shipping Weight	
	lbs.	kg
CEILING DIFFUSERS		
Step-Down LARTD30/36S	625	283
Flush LAFD30/36S	625	283
Transitions LASRT30/36	85	39
ECONOMIZER / OUTDOOR AIR / EXHAUST		
Economizer	138	63
Barometric Relief		
Downflow Barometric Relief Dampers	45	20
Horizontal Barometric Relief Dampers	20	9
Outdoor Air Dampers		
Damper Section (downflow) Motorized	72	33
Damper Section (downflow) Manual	68	31
Outdoor Air Hood (downflow)	76	34
Power Exhaust		
Standard Static	99	45
50% High Static	460	209
100% High Static with or without VFD	525	238
ELECTRIC HEAT		
30 KW	59	27
45 KW	76	34
60 KW	76	34
90 KW	84	38
120 KW	98	44
HUMIDITROL® DEHUMIDIFICATION SYSTEM		
Humiditrol® Dehumification Option (Net Weight)	100	45
PACKAGING		
LTL Packaging (less than truck load)	300	136
ROOF CURBS		
Hybrid Roof Curbs, Downflow		
14 in. height	115	52
18 in. height	140	64
24 in. height	170	77
Standard Curbs, Horizontal		
30 in. height	445	202
41 in. height	725	329

Measurement data for a Front End Loader from a previous Burnside project

Keating Construction (2004) Ltd.
Elora, Ontario

Table C02: Sound Power Calculations for FEL

Project No.: 300043184.0000

Description: Front End Loader

Measurement Weighting: A

Output Weighting: A

SOURCE TYP: Spherical

Sphere 1/ 2

Tonal Indicator:

Data Source: Meter

Enabled

Relevant: 1 1

Lw Technique: Spherical, Intensity, Parallelepiped, or Area	Point 1	Point 2	Point 3	Point 21	# of Points	Average Lpf	Lwf (dBA)	Adjustment for Weighting from 'A' to 'A'	LwfA (from Lwf)	Octave Sound Power
	Radius (m)	Radius (m)	Radius (m)	Radius (m)		L'p				
(Hz)	7.500	7.500	7.500	7.500	7.5		1			
	Lpfi (dBA)	Lpfi (dBA)	Lpfi (dBA)	Lpfi (dBA)		(dBA)	2	(dB)	(dBA)	(dBA)
FileID	ETS KH003									
Comment										
12.5	0.0				1	0.01	25.5		25.5	37.55
16	8.1				1	8.06	33.5		33.5	
20	9.4				1	9.37	34.9		34.9	
25	16.0				1	15.96	41.4		41.4	65.19
32	34.0				1	34.02	59.5		59.5	
40	38.4				1	38.35	63.8		63.8	
50	41.6				1	41.64	67.1		67.1	87.52
63	61.6				1	61.61	87.1		87.1	
80	51.3				1	51.25	76.7		76.7	
100	55.8				1	55.76	81.2		81.2	90.15
125	60.9				1	60.89	86.4		86.4	
160	61.2				1	61.24	86.7		86.7	
200	64.9				1	64.86	90.3		90.3	95.57
250	66.0				1	65.98	91.5		91.5	
315	65.0				1	65.02	90.5		90.5	
400	67.1				1	67.09	92.6		92.6	99.27
500	69.5				1	69.52	95.0		95.0	
630	70.0				1	69.96	95.4		95.4	
800	69.5				1	69.47	95.0		95.0	100.63
1,000	71.2				1	71.21	96.7		96.7	
1,250	70.2				1	70.21	95.7		95.7	
1,600	69.3				1	69.34	94.8		94.8	99.47
2,000	68.1				1	68.12	93.6		93.6	
2,500	70.0				1	69.97	95.5		95.5	
3,150	69.1				1	69.05	94.5		94.5	99.25
4,000	66.8				1	66.81	92.3		92.3	
5,000	70.4				1	70.42	95.9		95.9	
6,300	67.6				1	67.60	93.1		93.1	94.89
8,000	63.1				1	63.11	88.6		88.6	
10,000	59.5				1	59.48	85.0		85.0	
12,500	53.2				1	53.24	78.7		78.7	79.38
16,000	45.2				1	45.19	70.7		70.7	
20,000	34.1				1	34.10	59.6		59.6	
Overall (dB)	81.1				1.0	81.1	106.6		106.6	106.6

This Reference used for Car wash bay noise - EX010

Description: Bay E Side N
 Measurement Weighting: A
 Output Weighting: A
 SOURCE TYP: Spherical
 Sphere 1/4
 Tonal Indicator:
 Data Source: Meter
 Enabled 1

Relevant: 1 1

Lw Technique: Spherical, Intensity, Parallelepiped, or Spherical	Point 1	Point 2	# of Points	Average Lpf	Bckgnd Noise	Delta L	Delta L >3 Check	Correction K1	Corrected Avg Lpf	Lwf (dBA)	Adjustment for Weighting from 'A' to 'A'	LwFA (from Lwf)	Octave Sound Power
	Radius (m)	Radius (m)		L"p	L"p	L"p - L"p							
(Hz)	8.000	8.000	8						Col a	1			
	Lpfi (dBA)	Lpfi (dBA)		(dBA)	(dBA)	(dB)		(dB)	(dBA)	4	(dB)	(dBA)	(dBA)
FileID	5Jan016												
Comment													
12.5	3.3		1	3.34		3.34	yes		3.34	26.4		26.4	37.70
16	8.4		1	8.37		8.37	yes		8.37	31.4		31.4	
20	13.1		1	13.10		13.10	yes		13.10	36.1		36.1	
25	19.4		1	19.41		19.41	yes		19.41	42.4		42.4	53.00
32	21.9		1	21.90		21.90	yes		21.90	44.9		44.9	
40	28.8		1	28.78		28.78	yes		28.78	51.8		51.8	
50	30.1		1	30.13		30.13	yes		30.13	53.2		53.2	63.95
63	34.2		1	34.23		34.23	yes		34.23	57.3		57.3	
80	39.4		1	39.40		39.40	yes		39.40	62.4		62.4	
100	38.3		1	38.28		38.28	yes		38.28	61.3		61.3	69.65
125	42.1		1	42.12		42.12	yes		42.12	65.2		65.2	
160	43.6		1	43.55		43.55	yes		43.55	66.6		66.6	
200	45.3		1	45.26		45.26	yes		45.26	68.3		68.3	74.60
250	46.5		1	46.45		46.45	yes		46.45	69.5		69.5	
315	48.2		1	48.19		48.19	yes		48.19	71.2		71.2	
400	50.2		1	50.19		50.19	yes		50.19	73.2		73.2	80.48
500	52.4		1	52.39		52.39	yes		52.39	75.4		75.4	
630	54.4		1	54.43		54.43	yes		54.43	77.5		77.5	
800	56.2		1	56.20		56.20	yes		56.20	79.2		79.2	84.74
1,000	57.4		1	57.42		57.42	yes		57.42	80.5		80.5	
1,250	57.0		1	57.03		57.03	yes		57.03	80.1		80.1	
1,600	60.0		1	59.99		59.99	yes		59.99	83.0		83.0	92.89
2,000	66.6		1	66.55		66.55	yes		66.55	89.6		89.6	
2,500	66.2		1	66.19		66.19	yes		66.19	89.2		89.2	
3,150	62.0		1	61.96		61.96	yes		61.96	85.0		85.0	89.65
4,000	61.4		1	61.38		61.38	yes		61.38	84.4		84.4	
5,000	62.2		1	62.18		62.18	yes		62.18	85.2		85.2	
6,300	61.2		1	61.21		61.21	yes		61.21	84.2		84.2	86.55
8,000	58.1		1	58.09		58.09	yes		58.09	81.1		81.1	
10,000	54.8		1	54.80		54.80	yes		54.80	77.8		77.8	
12,500	51.1		1	51.12		51.12	yes		51.12	74.2		74.2	75.74
16,000	46.3		1	46.33		46.33	yes		46.33	69.4		69.4	
20,000	40.8		1	40.82		40.82	yes		40.82	63.9		63.9	
Overall (dB)	72.8		1.0	72.8					72.8	95.8		95.8	95.8

Description: BD15 - Bay Door 15

Measurement Weighting: A

Output Weighting: A

SOURCE TYP: Spherical

Sphere 1/ 2

Tonal Indicator:

Data Source: Meter

Enabled: 1

Relevant: 1 1

This reference was used for EX008 and EX009.
Measurement is of a rail car repair facility.

LW Technique: Spherical, Intensity, Parallelepiped, or Spherical	Point 1 Radius (m)	# of Points	Background				Chk Correction		Lwf (dBA)	Adjustment for Weighting from 'A' to 'A'	LwfA (from Lwf)	Octave Sound Power
			Average Lpf	Bckgnd Noise	Delta L	Delta L >3 Check	Correction K1	Corrected Avg Lpf				
			L'p	L"p	L'p - L"p							
(Hz)	0.400	0.4						Col a	1			
	Lpfi (dBA)		(dBA)	(dBA)	(dB)		(dB)	(dBA)	2	(dB)	(dBA)	
FileID												
Comment	old Pinchin Report											
12.5						warn						
16						warn						
20						warn						
25						warn						
32	53.6	1	53.60		53.60	yes		53.60	53.6	53.6	53.60	
40						warn						
50						warn						
63	63.8	1	63.80		63.80	yes		63.80	63.8	63.8	63.80	
80						warn						
100						warn						
125	74.4	1	74.40		74.40	yes		74.40	74.4	74.4	74.40	
160						warn						
200						warn						
250	84.8	1	84.80		84.80	yes		84.80	84.8	84.8	84.80	
315						warn						
400						warn						
500	92.0	1	92.00		92.00	yes		92.00	92.0	92.0	92.00	
630						warn						
800						warn						
1,000	96.2	1	96.20		96.20	yes		96.20	96.2	96.2	96.20	
1,250						warn						
1,600						warn						
2,000	97.0	1	97.00		97.00	yes		97.00	97.0	97.0	97.00	
2,500						warn						
3,150						warn						
4,000	92.9	1	92.90		92.90	yes		92.90	92.9	92.9	92.90	
5,000						warn						
6,300						warn						
8,000						warn						
10,000						warn						
12,500						warn						
16,000						warn						
20,000						warn						
Overall (dB)	101.2	1.0	101.2					101.2	101.2	101.2	101.2	



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Appendix E

Sample Mitigated Emergency Stationary Noise Modeling Printouts

Appendix E: Predictor Inputs

Point Source Limit of 100
Group

Item ID	Grp ID	Date	Name	Desc.	Shape	X	Y	Height	Rel.H	Abs.H	Terrain L
1 --											
210	0	#####	EX001	EX001	Point	549390.6	4841165	1.5	1.5	1.5	0

Grid Limit of 20
Group

Item ID	Grp ID	Date	1st Kid	Kid Cnl	Name	Desc.	Shape	X1	Y1	Height	Rel.H
1 --											
233	0	#####	-2865	5894	Grid		Polygon	549298.2	4841570		4.5

Receiver Limit of 88
Group

Item ID	Grp ID	Date	1st Kid	Kid Cnl	Name	Desc.	Shape	X	Y	Terrain L	HDef.
1 --											
214	0	#####	-2161	2	POR01	POR01	Point	549402.8	4841052	0	Relative
215	0	#####	-2167	1	OPOR1	OPOR01	Point	549406.9	4841072	0	Relative
216	0	#####	-2173	2	POR02	POR02	Point	549358.4	4841121	0	Relative
217	0	#####	-2179	1	OPOR2	OPOR02	Point	549368.9	4841131	0	Relative
218	0	#####	-2185	2	POR03	POR03	Point	549278.8	4841197	0	Relative
219	0	#####	-2191	1	OPOR3	OPOR03	Point	549288.6	4841211	0	Relative
220	0	#####	-2197	2	POR04	POR04	Point	549195.4	4841275	0	Relative
221	0	#####	-2203	1	OPOR4	OPOR04	Point	549208.2	4841288	0	Relative
222	0	#####	-2209	2	POR05	POR05	Point	549554.5	4841271	0	Relative
223	0	#####	-2215	1	OPOR5	OPOR05	Point	549540.9	4841255	0	Relative

Vertical Grid Limit of 20
Group

Item ID	Grp ID	Date	1st Kid	Kid Cnl	Name	Desc.	Shape	X1	Y1	Xn	Yn
---------	--------	------	---------	---------	------	-------	-------	----	----	----	----

Barrier Limit of 20
Group

Item ID	Grp ID	Date	1st Kid	Kid Cnl	Name	Desc.	Shape	X1	Y1	Xn	Yn
1 --											
224	0	#####	-2221	1			Polyline	549290.1	4841231	549425.4	4841100
231	0	#####	-2864	1			Polyline	549290.2	4841231	549117	4841400

Building Limit of 100
Group

Item ID	Grp ID	Date	Name	Desc.	Shape	X1	Y1	Height	Rel.H	Abs.H	Terrain L
1 --											
199	0	#####			Polygoi	613951.2	4850138	0	0	0	0
200	0	#####			Polygoi	613946.1	4850143	0	0	0	0
201	0	#####			Polygoi	613898.5	4850147	0	0	0	0
202	0	#####			Polygoi	613928.9	4850223	0	0	0	0
203	0	#####			Polygoi	549301.8	4841365	9	9	9	0
204	0	#####			Polygoi	549359.1	4841218	6	6	6	0
205	0	#####			Polygoi	549445.2	4841260	6	6	6	0
206	0	#####			Polygoi	549426.8	4841272	3	3	3	0

Day Limit 100 Sources, 88 PORs

Group / source	Reduct	POR01	POR01_	POR01	POR01	OPOR1	OPOR1_	OPOR1_	POR02_A	POR02_A	POR02_B	POR02_B	OPOR02_	OPOR02_
[dB]	result	corr.	result	corr.	result	corr.	result	corr.	result	corr.	result	corr.	result	corr.
EX001 - EX001	0	48.3	48.3	50.2	50.2	49.4	49.4	51.6	51.6	54.7	54.7	52.9	52.9	52.9
Total		48.3	48.3	50.2	50.2	49.4	49.4	51.6	51.6	54.7	54.7	52.9	52.9	52.9
(no category)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Exceeding	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Evening Limit 100 Sources

Group / source	Reduct	POR01	POR01_	POR01	POR01	OPOR1	OPOR1_	OPOR1_	POR02_A	POR02_A	POR02_B	POR02_B	OPOR02_	OPOR02_
[dB]	result	corr.	result	corr.	result	corr.	result	corr.	result	corr.	result	corr.	result	corr.
EX001 - EX001	0	--	--	--	--	--	--	--	--	--	--	--	--	--
Total	--	--	--	--	--	--	--	--	--	--	--	--	--	--
(no category)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Exceeding	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Night Limit 100 Sources

Group / source	Reduct	POR01	POR01_	POR01	POR01	OPOR1	OPOR1_	OPOR1_	POR02_A	POR02_A	POR02_B	POR02_B	OPOR02_	OPOR02_
[dB]	result	corr.	result	corr.	result	corr.	result	corr.	result	corr.	result	corr.	result	corr.
EX001 - EX001	0	48.3	48.3	50.2	50.2	49.4	49.4	51.6	51.6	54.7	54.7	52.9	52.9	52.9
Total		48.3	48.3	50.2	50.2	49.4	49.4	51.6	51.6	54.7	54.7	52.9	52.9	52.9
(no category)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Exceeding	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Limit of 88

Description	X	Y	Height	Day	Evening	Night	Li
POR05	5E+05	5E+06	4.5	29.7	--	--	34.5
POR05	5E+05	5E+06	1.5	29.1	--	--	33.9
POR04	5E+05	5E+06	4.5	44.3	--	--	49.1
POR04	5E+05	5E+06	1.5	43.5	--	--	48.3
POR03	5E+05	5E+06	4.5	48.2	--	--	53
POR03	5E+05	5E+06	1.5	46	--	--	50.8
POR02	5E+05	5E+06	4.5	54.7	--	--	59.5
POR02	5E+05	5E+06	1.5	51.6	--	--	56.4
POR01	5E+05	5E+06	4.5	50.2	--	--	55
POR01	5E+05	5E+06	1.5	48.3	--	--	53.1